

CHAPTER 11: THE EVERGLADES STORMWATER PROGRAM

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SUMMARY

The primary goal of the Everglades Stormwater Program (ESP) is to ensure that state water quality standards are achieved, to the maximum extent practicable, by December 31, 2006, at all water control structures included in the Non-ECP permit, issued by the Florida Department of Environmental Protection (DEP). The ESP program includes multiple elements to facilitate District's responsibilities under the Everglades Forever Act of 1994 (Act). Since its initial formation the ESP has been further enhanced by incorporating additional elements to increase program comprehensiveness and to broaden opportunities for public involvement. For example, Everglades Agricultural Area Best Management Practice (BMP) regulatory programs (rules 40E-63 and 40E-61, F.A.C.), discussed in Chapter 5 of this report, have been integrated into the ESP. This chapter, how-

ever, will only discuss ESP activities not associated with the Everglades Agricultural Area BMP program.

Activities that have been initiated or are planned to be initiated under the ESP include improved water quality monitoring programs; water quality data evaluation and reporting; regulatory activities; best management practices rule-making, as necessary; financial assessment programs; preliminary studies for water quality improvement facilities; public involvement initiatives; and educational programs. Success of the ESP requires cooperation from and coordination with local governments, state and federal agencies, environmental interest groups, agricultural and urban communities, Florida's Miccosukee and Seminole Indian tribes, and the general public.

INTRODUCTION

On April 20, 1998, the DEP issued an important permit to the District, known as the Non-ECP Permit (DEP File Number 06, 50259070). This permit was issued pursuant to Sections 9(k) and 9(l) of the Act. The permit authorized the continued operation of water control structures operated, maintained, and controlled by the District that discharge waters into, within or from the Everglades Protection Area and that were not included in the permit(s) issued for the Everglades Construction Project (ECP). **Figure 11-1** displays the location of the structures included in the Non-ECP permit, the basins and structures of primary concern for the ESP and the boundaries of the Everglades Protec-

tion Area. **Table 11-1** lists all District-controlled structures included in the Non-ECP permit. The Non-ECP permit requires that the District implement schedules and strategies to: 1) achieve and maintain water quality standards; 2) evaluate existing programs, permits and water quality data; 3) develop a regulatory program where needed to improve water quality; and 4) developing a monitoring program to track the progress toward achieving compliance with water quality standards to the maximum extent practicable. Originally proposed for issuance in July 1996, the permit was subjected to an administrative challenge (Miccosukee Tribe of Indians, et al., v. South Florida Water Manage-

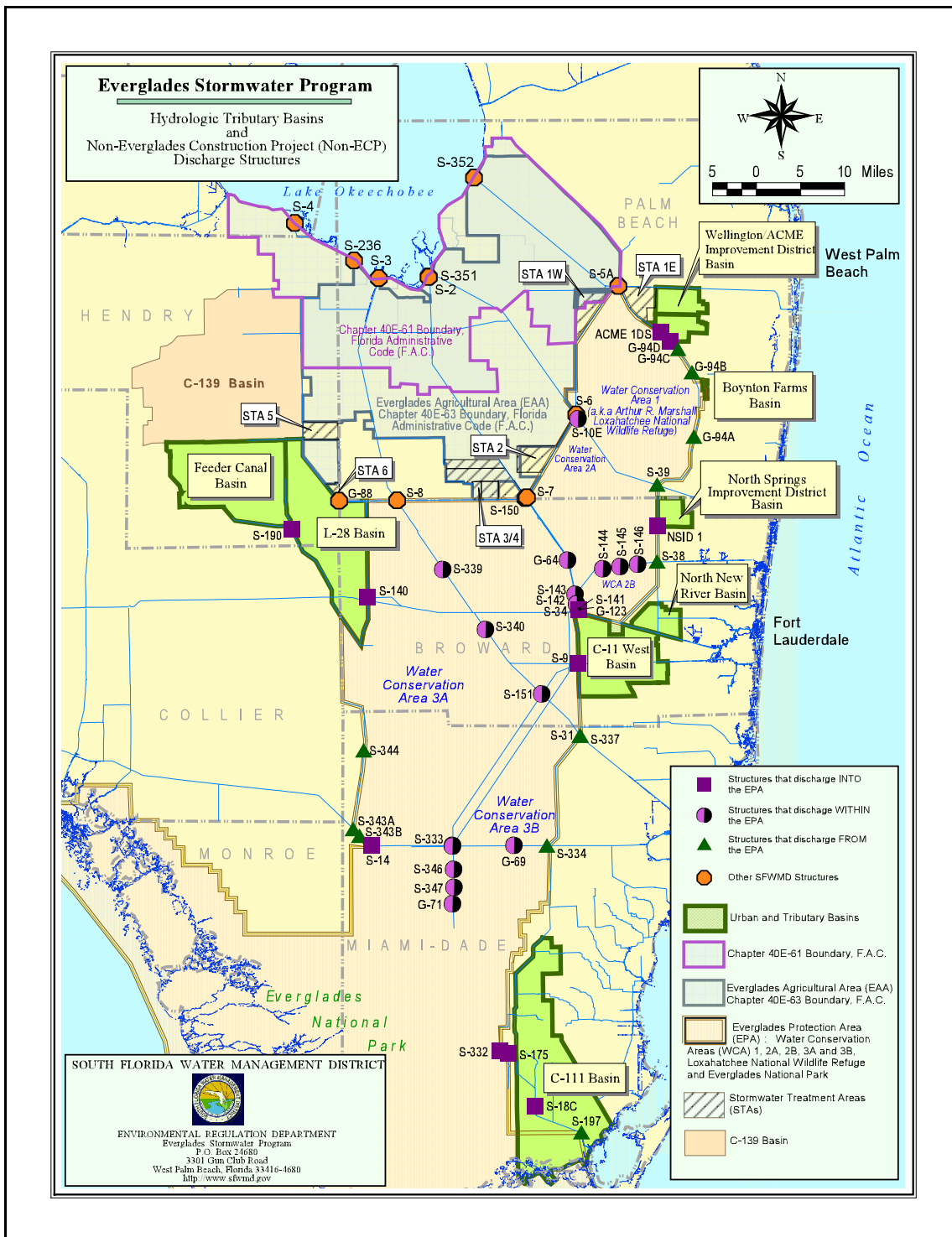


Figure 11-1. Everglades Stormwater Program hydraulic basins and Non-ECP structures.

ment District et al., DOAH Case No. 96-3151). After a three-week hearing in 1997, the administrative law judge concluded that the District had met statutory requirements of the permit, and issued a Recommended Order to the DEP on February 6, 1998. The DEP issued the Final Order on April 20, 1998, adopting the recommendations of the administrative law judge. An appeal of this final order was made to the Third District Court of Appeals [688 So.2d 927(Fla. 3d DCA 1997)]. The appeal was denied on November 12, 1998.

Table 11-1. Non-ECP structures.

INTO Structures	WITHIN Structures	FROM Structures
G-123	G-64	G-94A
S-9	G-69	G-94B
S-14	G-71	G-94C
S-18C	S-10E	S-31
S-140	S-141	S-34
S-175	S-142	S-38
S-190	S-143	S-39
S-332	S-144	S-197
	S-145	S-334
	S-146	S-337
	S-151	S-343A
	S-333	S-343B
	S-339	S-344
	S-340	
	S-346	
	S-347	

The strategies identified in the Non-ECP permit are being initiated through a diverse array of District projects. Since its initiation in April of 1998, the ESP has been intricately involved with the development of these programs and the completion of permit requirements. The ESP demonstrates the District's commitment to promoting the restoration and protection of the Everglades as

intended by the Act. The Everglades Construction Project, along with the ESP, are two complementary elements of the comprehensive Everglades Program as described in the *Everglades Program Implementation, Program Management Plan, Revision 3, SFWMD, 1997*. The Everglades Program includes elements detailed in Section (4) of the Act. These elements are described below and in other chapters throughout this report.

In accordance with Specific Condition 9 of the Non-ECP Permit, the information in this chapter, along with information supplied in other chapters and appendices of this report, provides an update and evaluation of the strategies and schedules contained in the permit.

Section (10) of the Act requires the District to submit an application for a modification to the Non-ECP permit by December 31, 2003. The Act identifies this permit as the Long-Term Compliance Permit. The Act requires this application to include plans for achieving State water quality standards in all parts of the Everglades Protection Area by December 31, 2006. The Long-Term Compliance Permit is differentiated from the Non-ECP permit by requiring the submittal of “plans” as opposed to “strategies” to achieve compliance with Act mandates. Strategies identified in the Non-ECP permit consist of problem identification, potential solution identification, and solution evaluation. Plans are more detailed than strategies; they consist of solution selection and implementation, and engineering design documents, as needed. Accordingly, numerous research, planning, monitoring, regulatory and construction activities are being integrated to ensure that appropriate plans are developed that will result in compliance with the Act by December 31, 2006. For a complete description of how the numerous plans and activities are being integrated, refer to Chapter 15 of this report.

THE EVERGLADES STORMWATER PROGRAM (EPS)

The ESP manages and implements water quality improvement strategies for Everglades tributary basins. The implementation of these strategies will provide the assurances needed for the application for the Long-Term Compliance Permit. The Act specifically requires the District to implement schedules and strategies under the Non-ECP permit for the following:

1. Achieving and maintaining water quality standards;
2. Evaluating existing programs, permits and water quality data;
3. Acquiring lands and constructing and operating water treatment facilities, if appropriate, together with developing a funding mechanism; and
4. Developing a regulatory program to improve water quality, including identifying structures or systems requiring permits or modifying existing permits. See Chapter 373.4592(9)(k) Fla Stat.

The Act and Non-ECP permit also require the District to implement a monitoring program to ensure the accuracy of data and measure the progress toward achieving compliance with State water quality standards.

Together, these strategies comply with applicable legislative requirements of the Act and the Non-ECP permit and are commonly referred to as the ESP elements. The ESP elements work in coordination with the ECP and other complementary elements of the comprehensive Everglades Program that comply with other sections of the Act. ESP elements cover specific tributary basins and structures.

The ESP elements are as follows:

- Water Quality Monitoring
- Reporting Requirements
- Regulatory Action Strategy
- Water Quality Improvement Plans
- Financial Assessment
- Public Involvement Initiatives

As shown in **Figure 11-1** and in the Program Management and Implementation section below, there are eight tributary basins to which the above strategies are managed and implemented. These ESP basins are in addition to the basins administered through the ECP and include existing urban, agricultural and Indian reservation lands:

- Wellington / ACME Improvement District
- Boynton Farms
- North Springs Improvement District
- North New River
- C-11 West
- C-111
- L-28
- Feeder Canal

Structures discharging into, within and from the Everglades Protection Area will also benefit from upstream improvements to water quality, which occur as a result of other components of the Everglades restoration efforts. These components include the Everglades Construction Project (see Chapter 6), Everglades research and monitoring programs (see Chapters 3, 4, 6, 7 and 8), and the Everglades Agricultural Area BMP Program (see Chapter 5).

ESP ELEMENTS

WATER QUALITY MONITORING

The Non-ECP permit authorized a comprehensive water quality monitoring program for over 250 constituents at 44 different structures. This monitoring program is unprecedented in both size and scope, and will continue to provide a highly valuable resource for understanding water quality throughout the Everglades Protection Area. The accuracy of the data collected and the progress toward achieving and maintaining water quality standards will continue to be evaluated through annual data analysis and reported in Everglades consolidated annual reports (See Chapter 4).

Specific Condition number 7 of the Non-ECP Permit required the District to first update the District's water quality data base for Non-ECP structures and then evaluate these data based on a comparison to State water quality standards. This permit condition also required a second water quality data evaluation in which the District was required to update the first data evaluation by including the first 12 months of data collected pursuant to this permit. Since the water quality monitoring program required by this permit was initiated over a full year prior to permit issuance, both the first and second data evaluation reports were submitted as part of the Non-ECP Permit's first annual report on April 20, 1999.

The data evaluations included in the first annual report indicated that from October 1, 1988, to April 30, 1997, (Non-ECP baseline data) and from May 1, 1997, to April 30, 1998, (Non-ECP first year's data), with the exception of dissolved oxygen, very few excursions from Class III water quality numeric criteria were found at Non-ECP structures. Annual average flow-weighted mean total phosphorus (TP) concentrations at Non-ECP structures were also reported for the above referenced periods of record. The annual average flow-weighted mean TP concentrations for the period

May 1, 1997 to April 30, 1998, ranged from 4 parts per billion (ppb) at the S-197 Structure to 105 ppb at the G-94D Structure; however, TP concentrations were well below 50 ppb at most Non-ECP structures.

Chapter 4 of this report includes a comparison of water quality data at Non-ECP structures to State water quality standards from May 1, 1998 to April 30, 1999. These comparisons fulfill Non-ECP permit requirements to document the accuracy of the data collected and to measure progress toward achieving and maintaining compliance with State water quality standards. A brief summary of these comparisons are included in the individual basin subsections below.

REPORTING REQUIREMENTS

As required by Specific Condition 5 of the Non-ECP permit, on an annual basis the District is required to submit a report that includes a description and evaluation of the implementation of strategies and schedules contained in the permit, as appropriate. These reports will also include the results of the evaluation of water quality data, updates on the implementation of the Regulatory Action Strategy and the Mercury Screening Program. Information contained in this Chapter and in Chapters 2, 3, 4, 5, 6, 7, 8 and 10 of this report fulfills the reporting requirements of the Non-ECP permit. The Non-ECP permit expands on the reporting requirements as detailed in the specific conditions of the permit. These additional requirements are listed in **Table 11-2**.

In addition to the required reports, the District has prepared several informational products that discuss different aspects of the Everglades Program. Currently, the District is producing a document titled the Everglades Stormwater Program Overview. This document will provide an excellent summary of the various elements that make up the

Table 11-2. Non-ECP permit reporting requirements.

Specific Condition	Reporting Requirement	Location in Annual Report
4	New Permit or Permit Mods	Not Applicable at this Time
5	Submittal of Annual Report	Chapters 1, 4, 5, 6, 7, 8, 11, 12, 15
6	Land Acquisition & Water Treatment Facility Status Update	Chapter 12
7	First & Second Data Evaluation Reports	Completed in 1998 Annual Report
8	Regulatory Action Report	Chapter 11
9	Update on Implementation of Schedules & Strategies	Required for Interim Report Only
10	CompQAP	CompQAP 870166G (DEP Approved)
11	Mercury Screening Program Report	Chapter 7
12	Annual Report Requirements	Chapters 4,11, Appendix 4
12(b)	Dates of Sampling	Appendix 4-10
12(c)	Water Quality Sampling Methodology	CompQAP 870166G (Sec's 6.0 & 7.0)
12(d)	Map of Sampling Locations	Chapter 4, Figure 4-41
12(e)	Statement of Sampling Authenticity	Appendix 4-11
12(f)	CompQAP	CompQAP 870166G (DEP Approved)
12(g)(i-v)	Water Quality Data & Associated Information	Appendix 4-10
12(g)(iv)	Monthly Flow Volumes	Appendix 4-6
12(h)	Water Quality Data Evaluation	Chapter 4
12(i)	Recommendations for Improving WQ Monitoring	Completed in 1998 Annual Report
12(j)	Implementation of Strategies	Chapters 1, 4, 5, 6, 7, 8, 11, 12, 15
16	Monitoring Locations Report	Submitted to FDEP in 1998
19	Additional Strategies (if Developed)	Not Applicable at this Time

ESP. Contact the District's Office of Communications to obtain literature and other media on the ESP and the Everglades Program.

Also available is a myriad of information on the Internet. A starting point is the District's web page found at <http://www.sfwmd.gov/major> projects. Links can be found to other projects related to the Everglades and to other organizations that have jurisdiction on different aspects of the Everglades restoration.

REGULATORY ACTION STRATEGY

The Regulatory Action Strategy (RAS) is an important element of the overall approach to restore the Everglades by achieving and maintaining water quality in the Everglades Protection Area to the maximum extent practicable. The RAS

applies to both Non-ECP structures discharging into the Everglades Protection Area (See **Figure 11-1**), and all upstream discharge structures within each ESP basin. Individual basin location maps are included in the Program Management and Implementation section of this chapter below.

The RAS consists of a process that begins with an inventory of all structures discharging directly into the Everglades Protection Area. Water quality monitoring programs at the inventoried structures have been either initiated, continued unchanged, or refined, as needed.

Where water quality analysis at structures discharging into the Everglades Protection Area indicate that meeting State water quality standards may be a cause for concern, upstream structures that are potential sources of the concern will be identified and monitored. Water quality improvement plans

will be developed with local governments and/or regulatory actions may be taken as needed to ensure that discharges from the upstream structures do not cause water quality problems at downstream locations. Appropriate actions could include development of geographically based regulatory programs (such as BMPs) or other programs requiring coordinated efforts by the District and other agencies. An analysis of water quality data will take place on an annual basis, as required by the Non-ECP permit, and will be documented in the annual Regulatory Action Report (See Chapter 4).

The RAS utilizes the following 10-step sequential approach to address basin-specific water quality problems.

- Step 1: Inventory of Direct Structures and Basin Information
- Step 2a: Characterize Available Water Quality Data
- Step 2b: Assess Comprehensiveness of Available Water Quality Data
- Step 2c: Develop or Refine Water Quality Monitoring Programs where Needed
- Step 3: Water Quality Monitoring for all Direct Structures
- Step 4: Evaluate Data from Direct Structures
- Step 5a, b & c: Shift Monitoring Burdens of Structures not Owned and/or Operated by the District with Identifiable Water Quality Concern. Also, Continue Monitoring all District Owned and Operated Structures Meeting Water Quality Standards
- Step 6: Identify Primary Structures Upstream from Direct Structures with Water Quality Concerns
- Step 7a: Identify Sources of Water Quality Data for Upstream Structures
- Step 7b: Assess Available Water Quality Data
- Step 7c: Develop a Water Quality Monitoring Program where Needed
- Step 8: Monitor Water Quality at Upstream Structures
- Step 9a: Maintain Monitoring for Upstream Structures not Owned or Operated by the District
- Step 9b: Implement Remedial Actions for Upstream Structures not Meeting Water Quality Standards
- Step 10a: Evaluate Need to Continue Monitoring at Upstream Structures in Compliance with Water Quality Standards
- Step 10b: Continue Monitoring Upstream Structures Owned and/or Operated by the District with Water Quality Concerns and Locate Additional Sources of Water Quality Concerns
- Step 10c & d: Shift Monitoring Burden for Upstream Structures not Owned or Operated by the District with Water Quality Concerns and Modify Permits as Needed
- Step 10e: Develop and Implement Basin Specific BMP Regulatory Program

The first Regulatory Action Report was included as Section 2 of the Non-ECP Annual Permit Monitoring Report and submitted to DEP on April 20, 1999. This report provided a detailed description of the RAS, its implementation schedule, and an update on the status of the implementation of Steps 1 through 4. In summary, the District has completed the inventory of all structures discharging directly into the Everglades Protection Area (Step 1). This inventory included identifying all primary structures, locations, structure data, contributing drainage basins, owner/operator, operational criteria, and permit status. In addition, existing BMP programs upstream have been identified. Geographic Information Systems (GIS) mapping of all contributing drainage boundaries and Non-ECP structures based on category type (into, with or from) is complete, subject to minor modifications as implementation of Step 6 occurs.

The District has also completed the identification of sources and assessment of the comprehensiveness of water quality data for all ESP basins (Steps 2a & b). The District has been conducting water quality monitoring at most Non-ECP structures since 1978 and has determined this program to be the best and, in some cases, the only source of water quality data for INTO structures, except for Boynton Farms Basin structures, which has no data available to date. An expanded monitoring program, as required by the Non-ECP permit, has been in effect since April 1997 (Step 3). In addition, Wellington/Acme Improvement District (ACME) and North Springs Improvement District (NSID) had provided the District with water quality data from monitoring programs required under Chapter 373 Fla. Stat. All District, NSID, and ACME data sets were assessed for comprehensiveness.

Ahead of schedule, the District analyzed all of the available water quality data since 1978 and presented it in the Non-ECP permit's first Annual Monitoring Report (Step 4). The data were submitted for three periods: 1) EFA baseline period (October 1978 to September 1988) 2) Non-ECP baseline period (October 1988 to April 1997) and 3) Non-ECP permit's first year monitoring period (May 1997 to April 1998). A comparison of EFA baseline, Non-ECP baseline and the permit's first year's data to the annual flow-weighted mean total phosphorus concentrations for all INTO structures for the period April 1998 through April 1999 are included in **Tables 11-4** through **11-9**. The permit's first Annual Monitoring Report also included District recommendations for developing or refining existing water quality monitoring plans (Step 2c). **Table 11-3** provides the annual arithmetic average TP concentrations taken from grab sampling and the annual flow-weighted mean TP concentrations for INTO structures from May 1, 1998 to April 30, 1999.

The District has elected not to shift the burden of monitoring to owners/operators and will continue monitoring at all INTO structures (Step 5). ACME and NSID will, however, continue to monitor water quality as required under Chapter 373

Fla. Stat. The District will also move efforts upstream to identify all potential sources of water quality concerns as outlined in steps 6 through 10 of the RAS. See the Program Management and Implementation section below for a description and status update of the implementation of RAS steps 6 through 10 for individual ESP basins. Refer to **Figure 11-2** below for the RAS implementation schedule.

WATER QUALITY IMPROVEMENT PLANS

By December 31, 2003, the District is required, by Section (10) of the Act, to submit an application for a long-term compliance permit to the Department that includes proposed changes to the ECP and Non-ECP permits for achieving compliance with State water quality standards by December 31, 2006. This application will include conceptual plans, cost estimates, funding mechanisms and schedules of implementation for basins that are not in compliance with State water quality standards. For basins that are in compliance with State water quality standards, the application will include plans for maintaining compliance.

To date, no formal plans have been developed for any of the Non-ECP basins discharging into the EPA. However, a conceptual design report titled Water Quality Improvement Strategy, for Acme Improvement District, Basin B, Burns and McDonnell, January 1999 has been developed for the ACME. This report is discussed in more detail under the Program Management and Implementation section below. It is anticipated that this conceptual design, alone, will not provide the treatment level required to meet the future numerical standard for phosphorus, additional treatment facilities or BMPs may be required.

Potential programs for Non-ECP basins discharging into the EPA include developing basin-specific regulatory programs which require the implementation of BMPs and/or the development of other non-structural water quality improvement

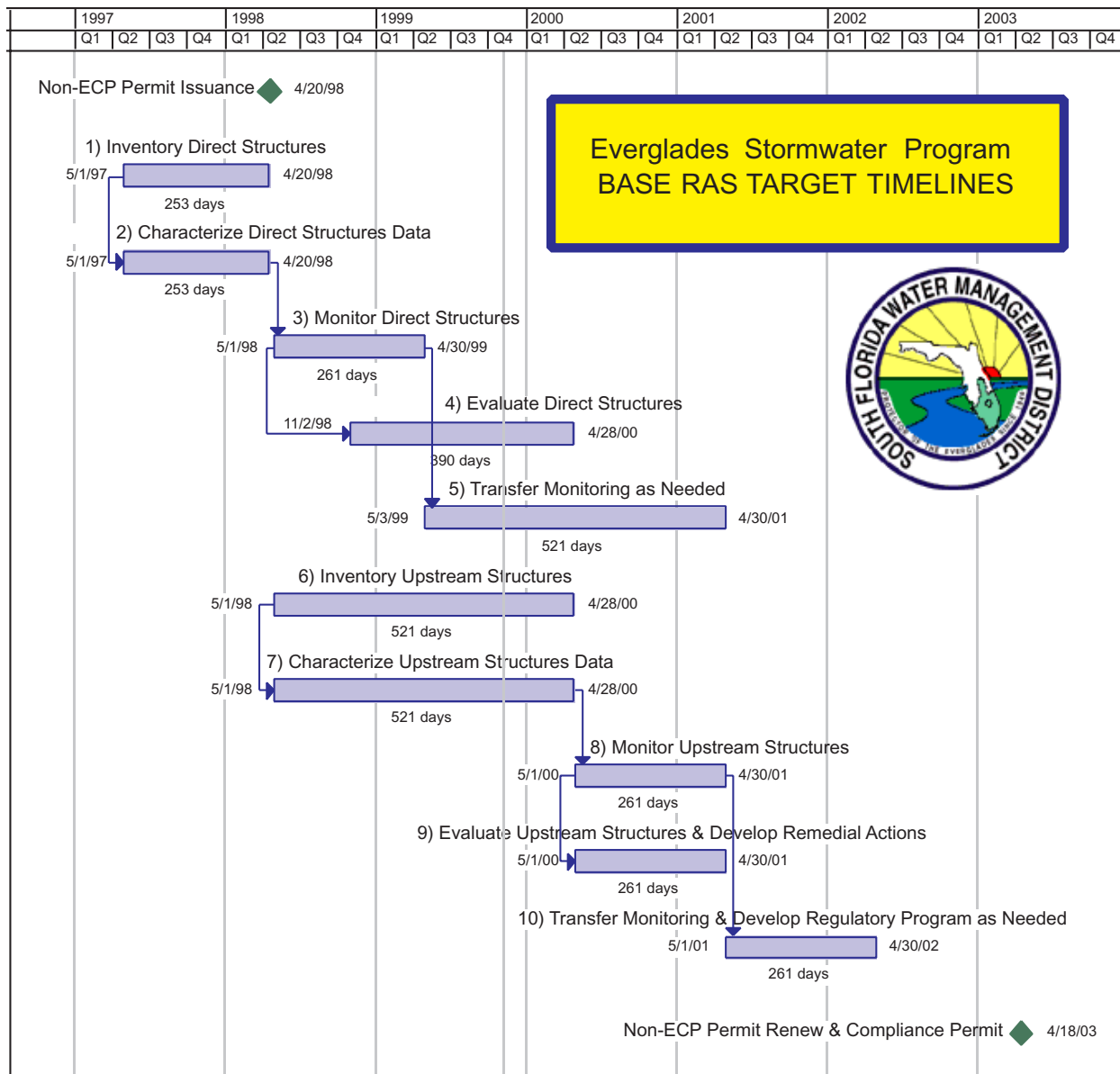


Figure 11-2. RAS implementation schedule.

Table 11-3. Annual flow-weighted mean TP concentrations for INTO structures From May 1, 1998 to April 30, 1999.

Hydrologic Basin	Station ID	Total Flow Volume (acre-feet)	Sample Size (Grab)	Number of Days with Positive Flow	Arithmetic Average (Grab) (µg/L)	Sample Size (Comp)	Sample Type	Total Samples/Samples During Flow	(1) Flow-Weighted Mean Concentration (µg/L)	(2) Flow-Weighted Mean Concentration (µg/L)
ACME	ACME1DS	ND ^{1, 6}	12	ND ^{1, 6}	94	0	Grab ⁴	12/6	133 ⁷	144 ⁷
	L40-1	19,791	12	88	100	0	Grab ⁴	12*/6	138	150
	G94D	ND ^{1, 6}	12	ND ^{1, 6}	130	0	Grab ⁴	12/7	164 ⁷	187 ⁷
	L40-2	16,943	12	100	121	0	Grab ⁴	12*/7	144	173
	WCA-2A at NSID 1 (Near S-38B)	6,762	4	28	18	0	Grab ⁴	4/3	18	18
North New River	G123	ND ¹	5	ND ¹	20	0	Grab ⁴	5/1	ND ¹	ND ¹
C-11 West	S9	221,585	52	187	14	40	Auto ⁵ & Grab ⁴	92/65	19	19
C-111	S332	107,189	25	350	8	0	Grab ⁴	25/24	7	7
	S175	17,047	24	743	7	0	Grab ⁴	24/7	5	6
	S18C	127,267	24	303	8	0	Grab ⁴	24/20	13	12
L-28	S140	94,543	15	150	44	0	Grab ⁴	15/9	52	55
Feeder Canal	S190	47,504	14	186	55	0	Grab ⁴	14/9	73	76
Boynton Farms	ND ¹									

1) ND - no data available.

2) Flow-weighted Mean Concentration Column (1) based on days of flow and monitored TP data only.

3) Flow-weighted Mean Concentration Column (2) based on estimation algorithm to determine TP concentration on non-flow days.

4) (Grab) indicates samples collected by grab sampling methodology.

5) (Auto) indicates that samples were collected by automatic composite sampler.

6) Flow data from upstream structures, L40-1 and L40-2, is representative of the flow through these culverts.

7) Flow weighted mean concentrations for ACME1DS and G94D were calculated using the flow data at upstream structures L40-1 and L40-2.

8) (*) Discontinued sampling at this location, three samples from downstream sites were used to complete the data set.

programs, with the goal of achieving State water quality standards. If it is determined that these programs are insufficient to provide reasonable assurances that water quality standards will be met at ESP structures, then the design of water treatment facilities, such as the water preserve areas and/or stormwater treatment areas, will be pursued. These treatment facilities may require the use of advanced treatment technologies.

In October 1999, the District entered into a contract with a consulting firm that will provide

basin-specific feasibility studies/conceptual designs for tributary basins discharging into the EPA. This contract includes several Non-ECP basins and basins associated with the ECP. The goal of this contract is to provide studies and conceptual designs that integrate information from ongoing STA design, construction and operation, ongoing research, regulation, and planning studies to determine the optimal combination of BMPs, optimized STAs, and advanced treatment technologies to meet the final water quality and water quantity objectives for the benefit of the Everglades.

FINANCIAL ASSESSMENTS

Regardless of the alternatives chosen to provide water quality treatment needed to meet State water quality standards, funding sources need to be identified. The financial assessment program authorized by the Act would allow a special assessment on property, based upon the stormwater treatment benefits being received. This assessment program is a potential funding mechanism to be used in conjunction with other available funding sources.

A conceptual methodology for the financial assessment is anticipated to be finalized by the end of 1999. Mapping within the Wellington/ACME basin is currently being developed to provide parcel identification and information for use in a pilot test of the financial assessment methodology and method of implementation. It is anticipated at this

time that this pilot test will be initiated early in the year 2000. Land use maps within other ESP basins are also being developed at this time and are planned on being used for financial assessments, if deemed appropriate.

PUBLIC INVOLVEMENT

An educational campaign is under way in which the ESP is coordinating with local entities in order to provide the general public with the information and resources needed to increase public awareness of natural South Florida ecology, including methods and local programs to improve water quality. The ESP is also working in cooperation with local universities to assist in the development of educational programs that will better prepare future professionals to meet the challenges of restoring and protecting the Everglades.

PROGRAM MANAGEMENT AND IMPLEMENTATION

PROGRAM ADMINISTRATION

Approximately 42 full-time employees and 3.3 million dollars will be dedicated to implement ESP programs in fiscal year 2000. The ESP is expected to grow significantly over the next five years, resulting in potentially hundreds of millions of dollars in costs associated with engineering design, land acquisition and construction activities.

WELLINGTON/ACME IMPROVEMENT DISTRICT BASIN (ACME)

The ESP is currently implementing the RAS in this basin in accordance with the schedule presented in **Figure 11-2**. ACME operates and maintains discharge structures, ACME1DS and G-94D, which discharge directly into the Everglades Protection Area **Figure 11-3**. These structures are located directly downstream of ACME pump station 1 (monitoring station L40-1) and ACME pump

station 2 (monitoring station L40-2). A basin boundary map was provided in last year's Non-ECP permit annual monitoring report (April 1999).

The District's historical water quality data at ACME1DS and the corresponding upstream location L40-1 as well as G-94D and the corresponding upstream location L40-2 were evaluated. No statistical difference was found between either ACME1DS and L40-1 data sets or between the G-94D and L40-2 data sets. Since there was no discharge data collected for ACME1DS and G-94D, flow-weighted mean concentrations for these locations were not available. However, since there was no significant difference in data sets, the District utilized phosphorous concentration data and ACME flow records to calculate flow-weighted mean concentrations at L40-1, L40-2, ACME1DS and G-94D. **Table 11-3** provides the annual arithmetic average TP concentrations taken from grab samples and the annual flow-weighted mean TP

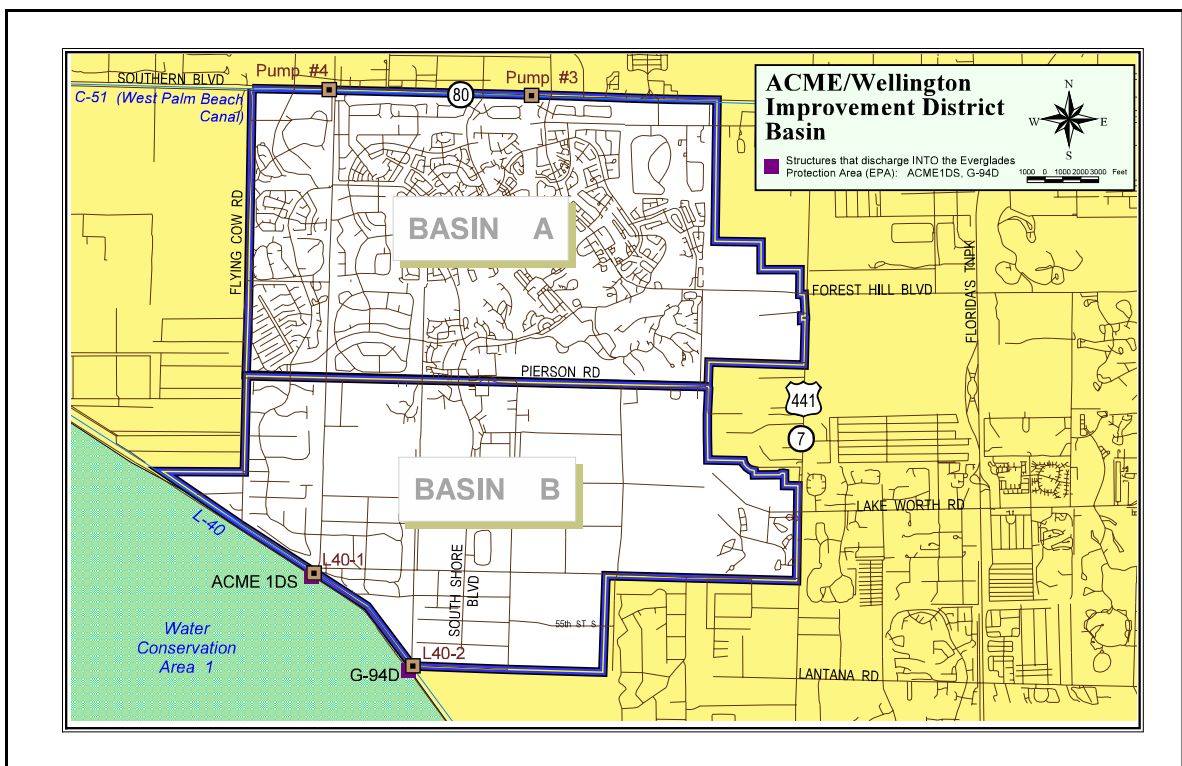


Figure 11-3. ACME/ Wellington Basin.

concentrations for ACME structures From May 1, 1998 to April 30, 1999.

The previous water quality monitoring program conducted by Wellington/ACME was revised to change the location of the total phosphorus compliance points to the L40-1 and L40-2. The District has entered a cooperative and cost-share agreement with Wellington/ACME to provide equipment and training on automated water quality and flow sampling at the two pump stations discharging to the Everglades Protection Area. Wellington/ACME will be collecting and analyzing the samples. In addition, Wellington/ACME will be collecting grab samples during flow events at upstream locations representative of various land uses within the basin to aid in determining areas of upstream water quality concerns. The District will then focus on these areas to determine if additional BMPs or treatment facilities are warranted.

In addition to implementing the RAS, a conceptual design report for water quality improvement strategies was finalized in January 1999 by Burns and McDonnell. This report will be utilized as a planning tool for comparison to other treatment facility and BMP alternatives within the basin. It is also being used as a planning tool for comparison to other alternatives under consideration by the U.S. Army Corps of Engineers (USACE) in the C&SF Restudy. This conceptual design report identified two areas for potential use as stormwater treatment areas. These two areas (Section 34 within Wellington's boundary and Section 24 just outside of Wellington's boundary) are currently being considered for addition to the Save Our Rivers acquisition list. The Village of Wellington is negotiating with the owner of the property within Section 34 to purchase that property for use as a stormwater treatment area. However, it is anticipated that this conceptual design, alone, will not provide the treatment level required to meet the future standard for total phosphorus. Additional treatment facilities or BMPs may be required.

The quality of discharges from ACME Basin B into the Refuge for the period of May 1, 1998 to April 30, 1999 is summarized in Chapter 4 of this report. **Table 11-3** provides the arithmetic annual average TP concentrations taken from grab samples and the annual flow-weighted mean TP concentrations for ACME structures From May 1, 1998 to April 30, 1999. The annual flow-weighted mean total phosphorus concentration for this period at L40-1 is 138 ppb and at L40-2 is 144 ppb. These values were greater than the annual flow-weight mean TP values at the same structures for the period of May 1, 1997 to April 30, 1998 (79 ppb and 104 ppb respectively). For non-phosphorus parameters the quality of discharges from L40-1 and L40-2 into the Refuge for the period of May 1, 1998 to April 30, 1999 were very similar to values for the period of May 1, 1997 to April 30, 1998. **Table 11-4** provides a side-by-side comparison of TP values for all monitoring periods. Other than for dissolved oxygen, there were few excursions from Class III numeric water quality criterion for any parameter. However, it is significant to point out that dissolved oxygen levels fluctuate in southern Florida environments and typically fall below the Class III water quality criterion of 5 mg/l as a result of natural biological processes and cycles.

BOYNTON FARMS BASIN

The District will continue to implement the RAS in this basin according to the schedule in **Figure 11-2**. The basin boundaries and discharge structures have been verified. A basin boundary map was provided in last year's Non-ECP permit annual monitoring report (**Figure 11-4**). A synoptic water quality survey will be conducted at each discharge structure. This survey will be used to develop a water quality monitoring plan for the basin to be conducted by the District for one year. After a year of monitoring, the District shall determine if the monitoring burden will be shifted to basin land owners. Future annual reports will include data summaries for Boynton Farms discharge structures.

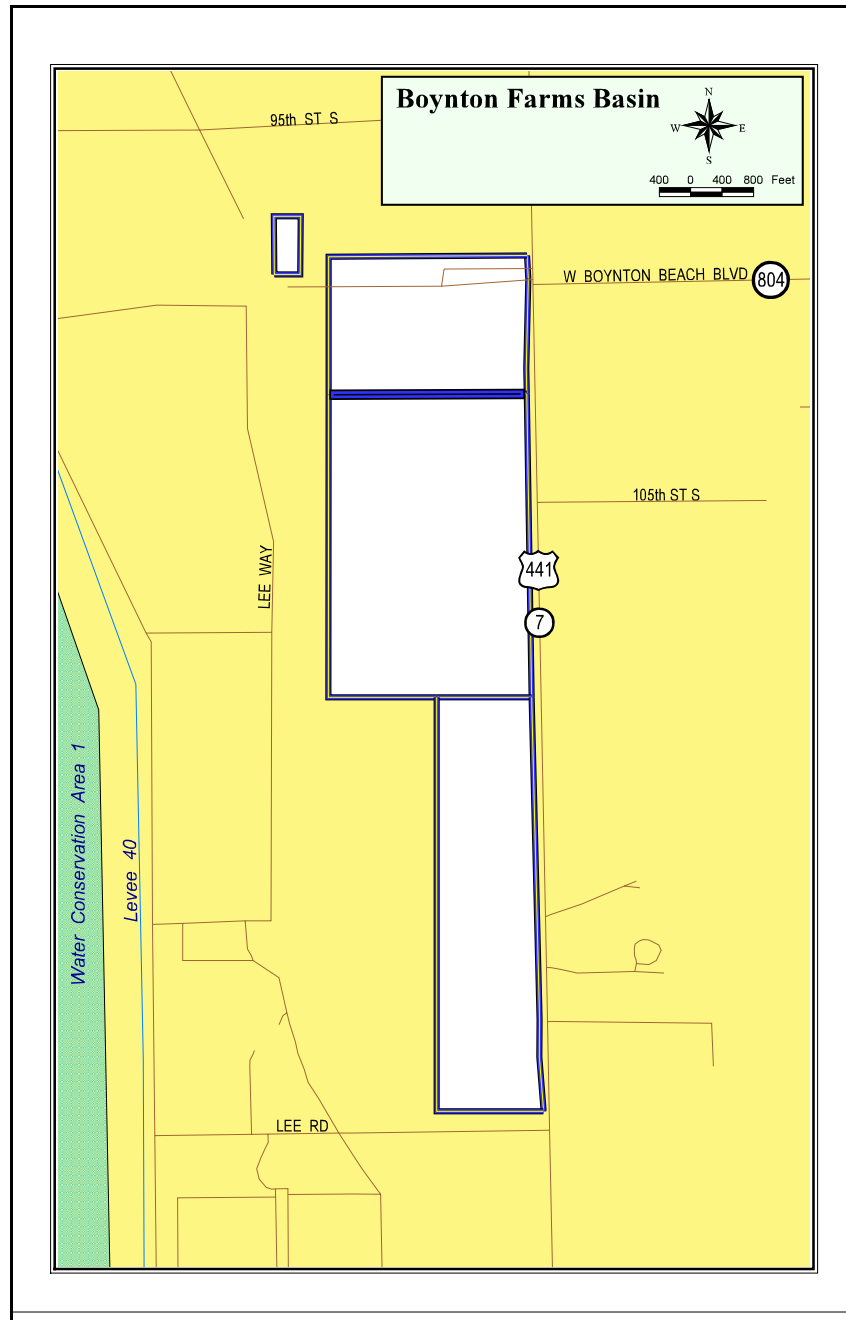


Figure 11-4. Boynton Farms Basin.

Table 11-4. Flow-weighted mean TP concentrations for ACME INTO structures.

Station ID	May 1, 1998 to April 30, 1999		May 1, 1997 to April 30, 1998		Oct 1, 1988 to April 30, 1997		Oct 1, 1978 to Sept 30, 1988	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L
ACME1DS	133	144	ND	ND	ND	ND	ND	ND
L40-1	138	150	79	88	66	ND	ND	ND
G94D	164	187	ND	ND	ND	ND	ND	ND
L40-2	144	173	104	101	165	ND	ND	ND

1) ND - no data available.

2) Flow-weighted Mean Concentration Column (1) based on days of flow and monitored TP data only.

3) Flow-weighted Mean Concentration Column (2) based on estimation algorithm to determine TP concentration on non-flow days.

This entire basin is currently within the footprint of the Agriculture Reserve Water Preserve Area. The District is pursuing acquisition of this area through a willing seller program. However, at this time the District has not determined if it will proceed with land acquisition activities in this area.

The ESP is currently implementing the RAS in this basin in accordance with the schedule presented in **Figure 11-2**. The primary discharge facility in this basin is a pump station known as NSID1, and four associated 48" discharge culverts (**Figure 11-5**). The District has been monitoring water quality on the WCA-2A side of the discharge culverts. **Table 11-3** provides the annual arithmetic average TP concentrations taken from grab sampling and the annual flow-weighted mean TP concentrations for NSID1 Pump Station from May 1, 1998 to April 30 1999. NSID has been monitoring upstream of this pump station, in the L-36 Borrow Canal, north and south of Structure S-38B and at two downstream locations within the WCA-2A.

Analysis of these data sets substantiate that no statistical difference exists between the various sampling sites, therefore multiple sampling locations near NSID1 are not necessary. Accordingly,

the NSID water quality monitoring program is being revised to change the location of the total phosphorus compliance point to the upstream side of NSID1. Compliance samples will be required to be taken during flow events. A cooperative and cost share agreement between the District and NSID is being developed to establish the details of the water quality monitoring program and responsibilities of the parties.

The quality of discharges from NSID into WCA-2A for the period of May 1, 1998 to April 30, 1999 is summarized in Chapter 4 of this report. The annual flow-weighted mean total phosphorus concentration from NSID1 for this period is 18 ppb. This value is lower than the annual flow-weight mean TP value for the period of May 1, 1997 to April 30, 1998 of 28 ppb. **Table 11-5** below provides a side-by-side comparison of TP values for all monitoring periods. For non-phosphorus parameters the quality of discharges from NSID1 into WCA-2A for the period of May 1, 1998 to April 30, 1999 were very similar to values for the period of May 1, 1997 to April 30, 1998. Other than for dissolved oxygen, there were no excursions from Class III numeric water quality criterion for any parameter.

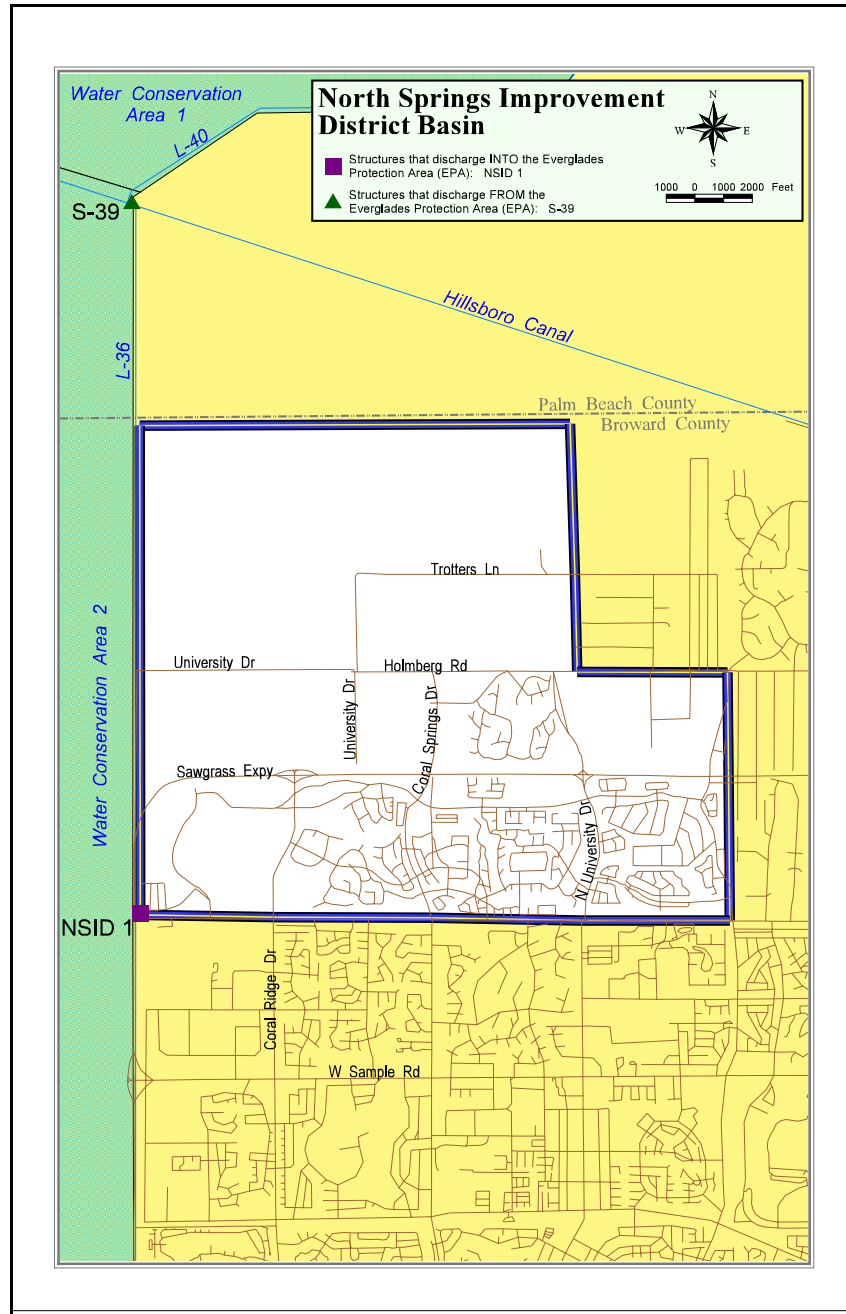


Figure 11-5. North Springs Improvement District Basin.

Table 11-5. Flow-weighted mean TP concentrations for NSID structures.

Station ID	May 1, 1998 to April 30, 1999		May 1, 1997 to April 30, 1998		Oct 1, 1988 to April 30, 1997		Oct 1, 1978 to Sept 30, 1988	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L
NSID (S38B)	18	18	28	33	48	ND	ND	ND

1) ND - no data available.

2) Flow-weighted Mean Concentration Column (1) based on days of flow and monitored TP data only.

3) Flow-weighted Mean Concentration Column (2) based on estimation algorithm to determine TP concentration on non-flow days.

NORTH NEW RIVER BASIN

The ESP is currently implementing the RAS in this basin in accordance with the schedule presented in **Figure 11-2**. A basin boundary map is provided as **Figure 11-6**. However, a revised basin boundary map is being prepared at this time. This map may include minor boundary modifications from the original basin map submitted in the Non-ECP permit application. A copy of this map will be submitted upon completion.

The discharge point, G-123 Structure, is a four-unit pumping plant located on the North New River Canal at the point where the North New River Canal emerges from WCA-2A. The District has been collecting water quality data at the G-123 Structure since 1982. **Table 11-3** provides the annual arithmetic average TP concentration taken from grab sampling at the G-123 Structure from May 1, 1998 to April 30, 1999. Structure operation records are not available to determine discharge volumes, therefore, flow-weighted mean phosphorous concentrations were not calculated. The District is planning the installation of additional instrumentation to be able to measure flow at this location and investigating the need for further

refinements to the water quality monitoring for this basin.

In addition to the implementation of the RAS, the ESP is coordinating with the local jurisdictional entities to initiate a comprehensive Water Quality Improvement Plan for this basin. The plan will involve the collective cooperation of various governmental agencies and local interests. Pilot studies developed in adjacent basins will be used as a model for implementing water quality improvement strategies and developing the comprehensive plan.

The quality of discharges from the G-123 structure for the period of May 1, 1998 to April 30, 1999 is summarized in Chapter 4 of this report. The arithmetic annual average total phosphorus concentration from G-123 for this period is 20 ppb. This value is comparable to the annual arithmetic average TP value for the period of May 1, 1997 to April 30, 1998 of 16 ppb. For non-phosphorus parameters the quality of discharges from G-123 for the period of May 1, 1998 to April 30, 1999 were very similar to values for the period of May 1, 1997, to April 30, 1998. Other than for dissolved oxygen, there were no excursions from Class III numeric water quality criteria for any parameter.

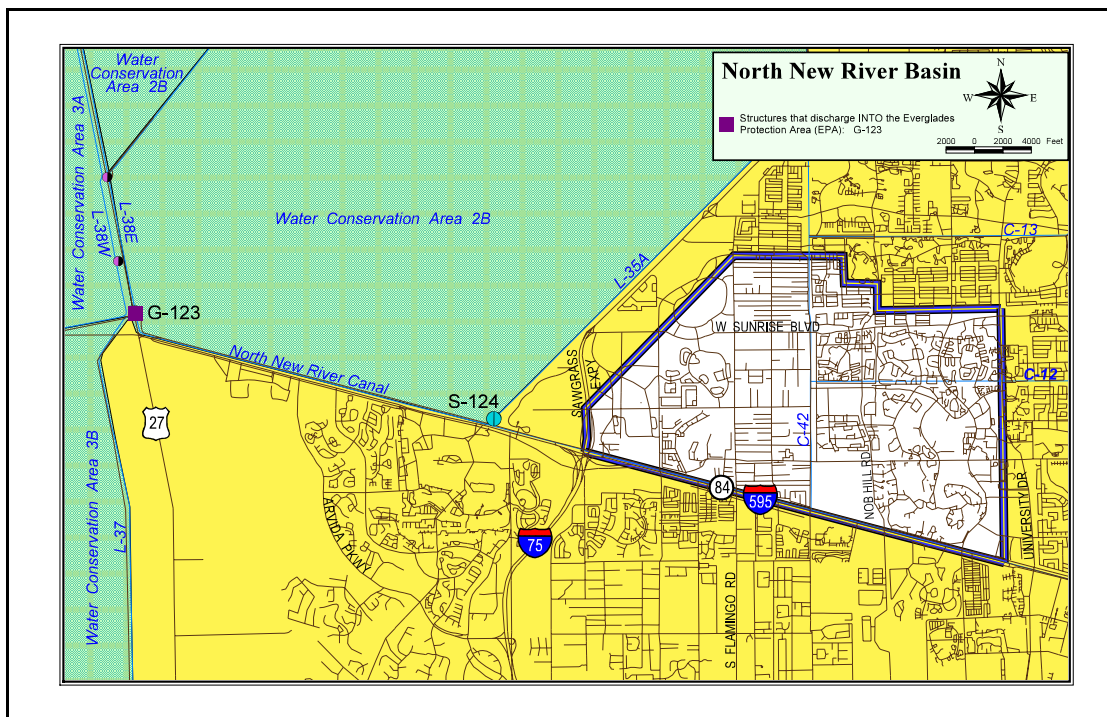


Figure 11-6. North New River Basin.

WESTERN C-11 BASIN WATER QUALITY IMPROVEMENT STRATEGIES

As reported in the January 1, 1999, Interim Report, there are parallel programs which focus on improving water quality within the western C-11 basin in Broward County (**Figure 11-7**). There has been extensive water quality monitoring at the primary discharge structure, S-9. The District has been collecting water quality data at this structure for many years. **Table 11-3** provides the arithmetic annual average TP concentrations taken from grab samples and the annual flow-weighted mean TP concentrations for the S-9 Structure from May 1, 1998 to April 30 1999. Through the implementation of the RAS, upstream contributing basins and secondary structures discharging into the C-11 Canal have been identified (Step 6). The District is in the process of compiling all data from outside sources and assessing it for comprehensiveness (Step 7A). A monitoring program for upstream structures (Step 7C) will be implemented according to the RAS schedule shown in **Figure 11-2**. Additionally, an assessment of land use and hydraulics is currently being completed in order to better characterize basin dynamics.

To better accommodate the characterization and quantification of potential water quality problems within the C-11 Canal beyond the historical monitoring program, four autosamplers and three Ultrasonic Velocity Meters were installed in July 1998 at specific locations in the western C-11 Canal. Potential impacts on water quality and vegetation downstream of the S-9 Pump Station in WCA-3A are also being monitored.

The District will also evaluate water quality improvement alternatives, such as BMPs, and alternative water quality treatment technologies that have potential application within the basin. Alternative treatment technologies are concurrently being evaluated and may be implemented in accordance with the information provided in Chapter 8 of this report.

The design of structural and operational changes to the water management system will also be completed through the western C-11 Basin Critical Restoration Project. The present schedule calls for the completion of construction of this project in October 2001. The District is co-sharing this project with the USACE following the guidelines of the Water Resources Development Act of 1996. This project includes the addition of: 1) a pump station adjacent to the S-9 Pump Station that will return collected seepage from WCA-3A, 2) a water control structure located in the C-11 canal east of Highway U.S. 27, designed to separate WCA-3A collected seepage from stormwater runoff collected within the canal, and 3) a series of finger canals east of U.S. 27 designed to reduce seepage inputs from the east.

The knowledge gained in previous activities will be utilized to implement BMPs within the basin, to design and construct water preserve areas and/or water quality treatment systems, and to design and construct alternative treatment technologies, as needed. Together these programs will be developed to ensure that discharges from the Western C-11 basin meet Class III water quality standards by December 31, 2006.

The quality of discharges from the S-9 Pump Station for the period of May 1, 1998 to April 30, 1999 is summarized in Chapter 4 of this report. The annual flow-weighted mean total phosphorus concentration at S-9 for this period is 19 ppb. This value is comparable to the annual flow-weighted mean TP value at S-9 for the period of May 1, 1997 to April 30, 1998 of 17 ppb. **Table 11-6** below provides a side-by-side comparison of TP values for all monitoring periods. For non-phosphorus parameters the quality of discharges from S-9 for the period of May 1, 1998 to April 30, 1999 were very similar to values for the period of May 1, 1997 to April 30, 1998. Other than for dissolved oxygen, there were no excursions from Class III numeric water quality criterion for any parameter.

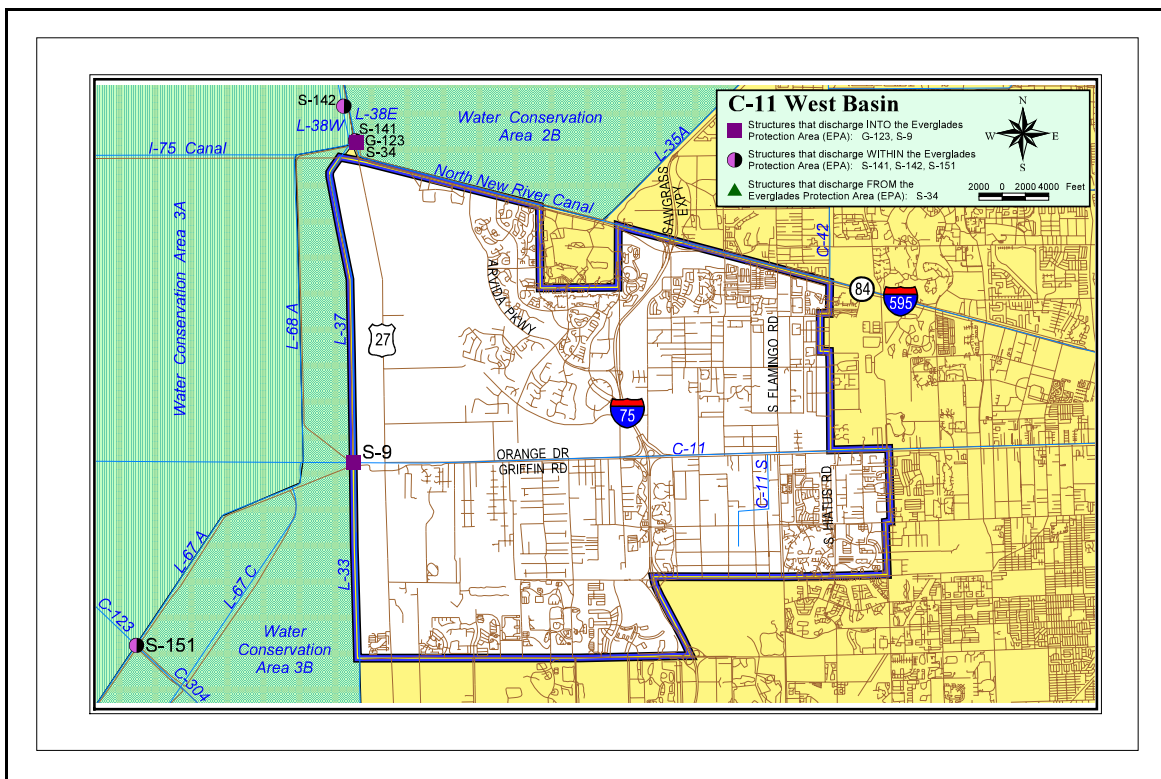


Figure 11-7. C-11 West Basin.

Table 11-6. Flow-weighted mean TP concentrations for the S-9 Structure.

Station ID	May 1, 1998 to April 30, 1999		May 1, 1997 to April 30, 1998		Oct 1, 1988 to April 30, 1997		Oct 1, 1978 to Sept 30, 1988	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L
S-9	19	19	17	17	14	ND	17	ND

1) ND - no data available.

2) Flow-weighted Mean Concentration Column (1) based on days of flow and monitored TP data only.

3) Flow-weighted Mean Concentration Column (2) based on estimation algorithm to determine TP concentration on non-flow days.

C-111 BASIN AND THE S-332D STRUCTURE.

The ESP is currently implementing the RAS in this basin in accordance with the schedule presented in **Figure 11-2**. The three primary into structures in this basin are S-332, S-175 and S-18C. The District has been monitoring at these structures since 1978. Refer to **Table 11-3** for District TP data at these structures. Due to the frequency of discharge events, the biweekly grab-sampling regime is being further evaluated to determine if it is adequate for calculating an annual flow-weighted TP concentration and loads to the EPA.

Under the RAS, permits issued by the District to landowners in this basin are currently being inventoried (Step 6). The District is also coordinating with Miami-Dade County to inventory regulatory permits that it has issued and to identify other sources of water quality data which may be available (Steps 6 & 7). A revised basin boundary map is being prepared at this time. This map may include minor boundary modifications from the original basin map submitted along with the Non-ECP permit application (**Figure 11-8**). A copy of this map will be submitted upon completion.

The quality of discharges from the C-111 Basin, for the period of May 1, 1998, to April 30,

1999 is summarized in Chapter 4 of this report. The annual flow-weighted mean total phosphorus concentration at S-175, S-332 and S-18C for this period are 5 ppb, 7 ppb and 13 ppb respectively. These values are equal to or lower than the annual flow-weighted mean TP values for the period of May 1, 1997 to April 30, 1998 at 10 ppb, 7 ppb and 13 ppb respectively. **Table 11-7** below provides a side-by-side comparison of TP values for all monitoring periods. For non-phosphorus parameters the quality of discharges from the C-111 basin for the period of May 1, 1998 to April 30, 1999 were very similar to values for the period of May 1, 1997 to April 30, 1998. Other than for dissolved oxygen, there were few excursions from Class III numeric water quality criterion for any parameter.

Other major activities occurring within the C-111 Basin include modifications to the C-111 canal system as outlined in the 1994 C-111 General Reevaluation Report (GRR), expansion of the District's water quality monitoring and assessment programs, and the start-up of the newest structure in the C-111 Basin, S-332D Pump Station.

The 1994 C-111 GRR authorizes modifications to the C-111 network that are designed to restore a more natural hydroperiod to Taylor Slough and the panhandle portion of Everglades National Park. The new structural features will mimic natural conditions by improving volume, timing and disper-

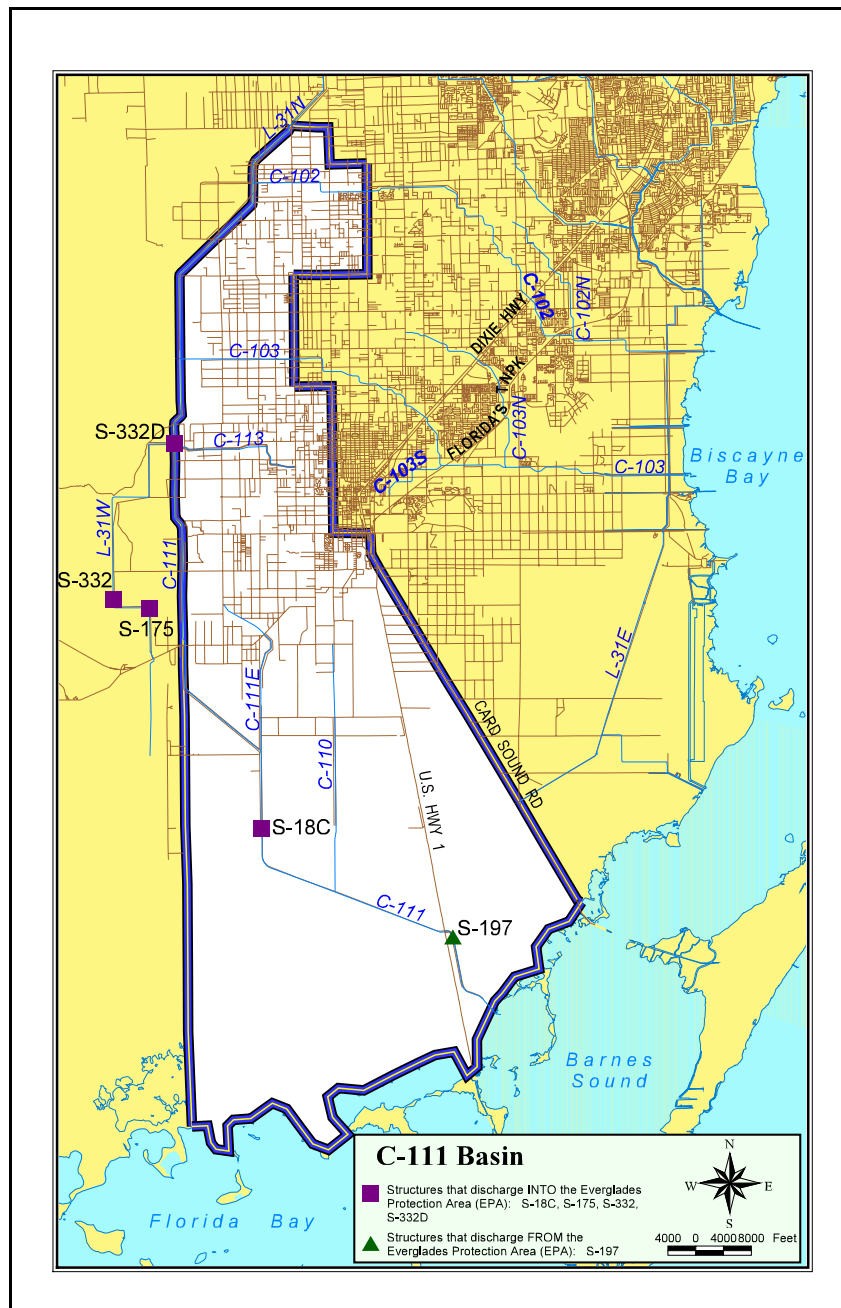


Figure 11-8. C-111 Basin.

Table 11-7. Flow-weighted mean TP concentrations for the C-111 Basin structures.

Station ID	May 1, 1998 to April 30, 1999		May 1, 1997 to April 30, 1998		Oct 1, 1988 to April 30, 1997		Oct 1, 1978 to Sept 30, 1988	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L
S-332	7	7	7	7	8	ND	6	ND
S-175	5	6	10	8	4	ND	ND	ND
S-18C	13	12	13	10	12	ND	8	ND

1) ND - no data available.

2) Flow-weighted Mean Concentration Column (1) based on days of flow and monitored TP data only.

3) Flow-weighted Mean Concentration Column (2) based on estimation algorithm to determine TP concentration on non-flow days.

sion of freshwater deliveries to Park ecosystems. More natural hydropatterns will also protect existing natural resources, restore the historic diversity and abundance of native Everglades flora and fauna, and reduce excessive freshwater inflows to Manatee Bay and Barnes Sound. The GRR plan recommends constructing a system of pumps, canals and culverts to create the capacity to divert flows to Taylor Slough.

Some of the components of the C-111 modifications have entered the construction phase. Fifty spoil mounds stacked between the gaps in the southern bank of the lower C-111 canal were reduced to natural grade in late 1997. Removal of the spoil material disperses flows into Everglades National Park marshes along the entire reach of the lower C-111 canal, and has added benefit of reducing direct discharges through S-197 into Manatee Bay and Barnes Sound. Construction of S-332D in the Frog Pond area was completed in December 1997. S-332D will be operated to divert flows into Taylor Slough via overbank flows along L-31W. Constriction of flows at Taylor Slough Bridge will be remedied by the construction of two wider replacement bridges. Construction of the replacement bridges is currently underway and will be completed in August 2000.

Implementation of the remaining C-111 modifications will be aided by current efforts to broaden the C-111 project scope to address increasing lands costs and to incorporate water quality features, as authorized in the Water Resources Development Act (WRDA) of 1996. The supplement to the 1994 GRR that is being prepared by the USACE will acknowledge the cost of the lands and allow the USACE to share the costs on a 50/50 basis. The supplement to the GRR will also describe water quality sampling, evaluation of water quality impacts and design of appropriate pollution prevention and/or treatment measures needed to ensure that C-111 discharges to Everglades National Park meet water quality standards. The supplement to the 1994 C-111 GRR will be completed in 2000.

Water quality impacts associated with construction and operation of the C-111 project modifications are being addressed through basin-specific assessments and best management practices (BMPs). Water quality assessments and BMP strategies include:

- Available C-111 Basin water quality data was compiled in a report titled *Preliminary Evaluation of Water Quality in the C-111 Canal Basin*, by the DEP, April 1997.

- A report titled, "Analysis of Water Quality and Hydrologic Data from the C-111 Basin," was completed by Dr. William W. Walker under contract to the U.S. Department of the Interior, Everglades National Park, October 3, 1997.
 - The District has contracted with the University of Miami to conduct a project that uses chemical and isotopic data to estimate ranges of groundwater flow rates, and to describe the groundwater flow patterns in Taylor Slough, Shark River Slough and south of the C-111 canal. The extent of saltwater intrusion will also be investigated.
 - The site of the spoil mound removal is being used to gauge the effectiveness of hydrologic restoration efforts. Studies conducted by District and Florida International University scientists will assess how the increased movement of freshwater, nutrients, organic matter from the C-111 canal affects the transitional wetlands of the Park panhandle and the northeastern portion of the Florida Bay estuary. A companion study will also look at the fate and effects of pesticides that may be draining from nearby agricultural areas into Park and Florida Bay.
 - A three-year demonstration project to determine optimal fertilization rates and irrigation efficiency in the South Miami-Dade County area began in 1997 and will be completed by March 2000. This project is expected to result in reductions in overall fertilizer use, movement of fertilizers and pesticides into surface water and associated leaching into groundwater, and it is also expected to make water use more efficient.
 - Expansion of the monitoring regime to ensure compliance with the Settlement Agreement and the Everglades Forever Act to capture impacts associated with S-332D operation.
 - Under the direction of the Florida Department of Agriculture and Consumer Services and Miami Dade County Department of Environmental Resource Management, numerous pesticide management strategies have been implemented in the region. Pesticide BMPs include the use of alternative pesticides which could reduce the frequency of applications. Education outreach programs are being conducted to ensure proper pesticide application.
 - The SFWMD has promoted the capping of open bore-holes used for irrigation. This preventive measure keeps pesticides from encroaching into well water. The District has also banned the use of endosulfan and atrazine as a condition of short-term leases of land in the Frog Pond agricultural area.
 - New SFWMD programs for the 2000 fiscal year include a pilot program to evaluate atmospheric deposition of pesticides. Although District principal monitoring will be located in the Everglades Agricultural Area, USDA/ARS has agreed to install an additional monitoring site in South Dade County. A second initiative is the proposed sediment bioassay to be performed in the St. Lucie River. The protocols developed for toxicity screening will be transferable to the South Dade agricultural community.
- Multiple factors have delayed the proposed operation of S-332D and Test 7 of the Experimental Program of Water Deliveries to Everglades National Park. S-332D was designed to add more water to the Taylor Slough portion of Everglades National Park by holding higher water levels in the L-31N canal, pumping S-332D to divert the water west along L-31W and reducing direct, pumped discharges into Taylor Slough by pumping less at S-332. These operational changes were designed to promote flow over the bank of L-31W, dispersing water into Taylor Slough in a way that mimics more natural patterns of sheetflow. This long-term strategy to rehydrate Taylor Slough is described in the October 1995 environmental assessment prepared by the US Army Corps of Engineers for Test 7, Phase 2 of the Experimental Program of Water Deliveries to Everglades National Park.

The start up of S-332D has been delayed by concerns in several key areas such as endangered species impacts, increased risk of flooding to agriculture and unknown water quality impacts. As the USACE, the Park and the District focused on Test 7 details in the spring of 1998, the US Fish and Wildlife Service (USF&WS) initiated a formal consultation process to evaluate endangered species impacts of the Modified Water Deliveries Project, the Experimental Program and the C-111 Project. The USF&WS was particularly concerned that existing operating schedules, including Phase 1 of Test 7, and several years of excessively wet weather conditions would threaten the endangered Cape Sable Seaside sparrow with extinction.

The USF&WS issued the final biological opinion in February 1999, calling for immediate operational modifications to protect the sparrow during the nesting season (March 1-July 15) and accelerated implementation of the Modified Water Deliveries project to afford long term protection to the sparrow and its habitat. The USACE responded in March by suspending indefinitely current operations under Test 7 Phase 1. A series of emergency measures was instituted to lower water levels in the western habitat to 6.0 feet or less in order to protect the sparrow. The plan sends water to the coast, puts water into the Northeast Shark River Slough instead of the Western Shark River Slough. The emergency plan also moves water into South Dade County canals, including limited use of S-332D. The sparrow relief plan received emergency authorization from DEP on the condition that a rigorous program of water quality sampling be implemented to measure the presence of nutrients and pesticides in surface and groundwater. The emergency plan and DEP authorization expired on August 15, 1999.

The USF&WS has reviewed the proposed operations of S-332D and concluded the operations would potentially impact nesting habitat for the sparrow in two sub-populations within the Taylor Slough basin. The original design and operation for S-332D provided the capability to pump up to 500 cfs into L-31W. Model analysis of the downstream

hydrology indicated that habitat of the sparrow could be adversely affected. In response, the USF&WS has restricted pump rates to a maximum of 165 cfs during the sparrow breeding season (USF&WS determined the season ends July 15). The USF&WS has requested, and the USACE has agreed to provide, more detailed analysis using finer scale models to evaluate these water level concerns. Until such time that the USF&WS can complete this analysis, the restrictions on operations imposed by FWS will remain in effect.-

Since the District accepted the completed pump station in January 1998, interagency efforts to operate S-332D under Test 7 centered on these issues, which have been resolved:

- Expand the existing District water quality sampling network to assess the impacts of S-332D operation. In April 1999 the USACE began the installation of an extensive hydrologic and water quality sampling network to monitor short term operational changes undertaken to protect sparrow habitat during the spring '99 nesting season. If the USACE is successful in its plans to extend this monitoring network past this year's sparrow nesting season, then this sampling network will support the S-332D operating permit and the development of a water quality strategy for the rest of C-111 project implementation.
- Modify the Non-ECP permit issued by DEP to the District in April 1998 to operate S-332D according to Test 7 criteria. The District submitted a permit application on May 1, 1998 that reiterated the Test 7 criteria that would be used to operate S-332D and described a monitoring regime that would be used to address water quality. The application remains incomplete pending the USACE's resolution of endangered species concerns raised by USF&WS.
- Acquire lands in the Rocky Glades that could experience higher water levels due to S-332D pumping. As part of the C-111 project, the District acquired the affected lands on a willing seller basis, closing on the properties in

January 1999. The Department of Interior acquired the effected lands that fell within the Park expansion area, using a declaration of taking to place the lands in public ownership by April 1999.

L-28 BASIN

The primary discharge structures in this basin are Pump Station S-140 and an associated gated spillway, which controls flows that may bypass the pump (**Figure 11-9**). These structures serve lands owned by the Florida's Miccosukee and Seminole Indian tribes and private agricultural land users. Water quality monitoring at S-140 has been ongoing since 1978. Refer to **Table 11-3** for the District's TP data at this structure. Due to the frequency of discharge events, biweekly grab sampling was determined to be insufficient for calculating annual flow-weighted TP concentrations and loads to the EPA. Installation of an autosampler was recommended and District staff is currently investigating alternatives for installation of equipment that best suits the hydraulic flow patterns at this location.

Upstream structures are being identified in cooperation with the Miccosukee and Seminole tribes. Water quality data being collected by the Miccosukee and Seminole tribes and the District are presented regularly in semi-annual progress reports. The RAS will utilize this information to determine potential water quality concerns in upstream areas. The District will continue to implement the RAS according to the schedule in **Figure 11-2**.

The quality of discharges from the S-140 Structure for the period of May 1, 1998, to April 30, 1999, is summarized in Chapter 4 of this report. The annual flow-weighted mean total phosphorus concentration at S-140 for this period is 52 ppb. This value is slightly higher than the annual flow-weighted mean TP value at S-140 for the period of May 1, 1997, to April 30, 1998, of 37 ppb. **Table 11-8** provides a side-by-side comparison of TP values for all monitoring periods. For non-phosphorus parameters the quality of discharges from S-140 for the period of May 1, 1998 to April 30, 1999 were very similar to values for the period of May 1, 1997 to April 30, 1998. Other than for dissolved oxygen, there were no excursions from Class III water quality criterion for any parameter.

Table 11-8. Flow-weighted mean TP concentrations for the S-140 Structure.

Station ID	May 1, 1998 to April 30, 1999		May 1, 1997 to April 30, 1998		Oct 1, 1988 to April 30, 1997		Oct 1, 1978 to Sept 30, 1988	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L
S-140	52	55	37	36	36	ND	213	ND

1) ND - no data available.

2) Flow-weighted Mean Concentration Column (1) based on days of flow and monitored TP data only.

3) Flow-weighted Mean Concentration Column (2) based on estimation algorithm to determine TP concentration on non-flow days.

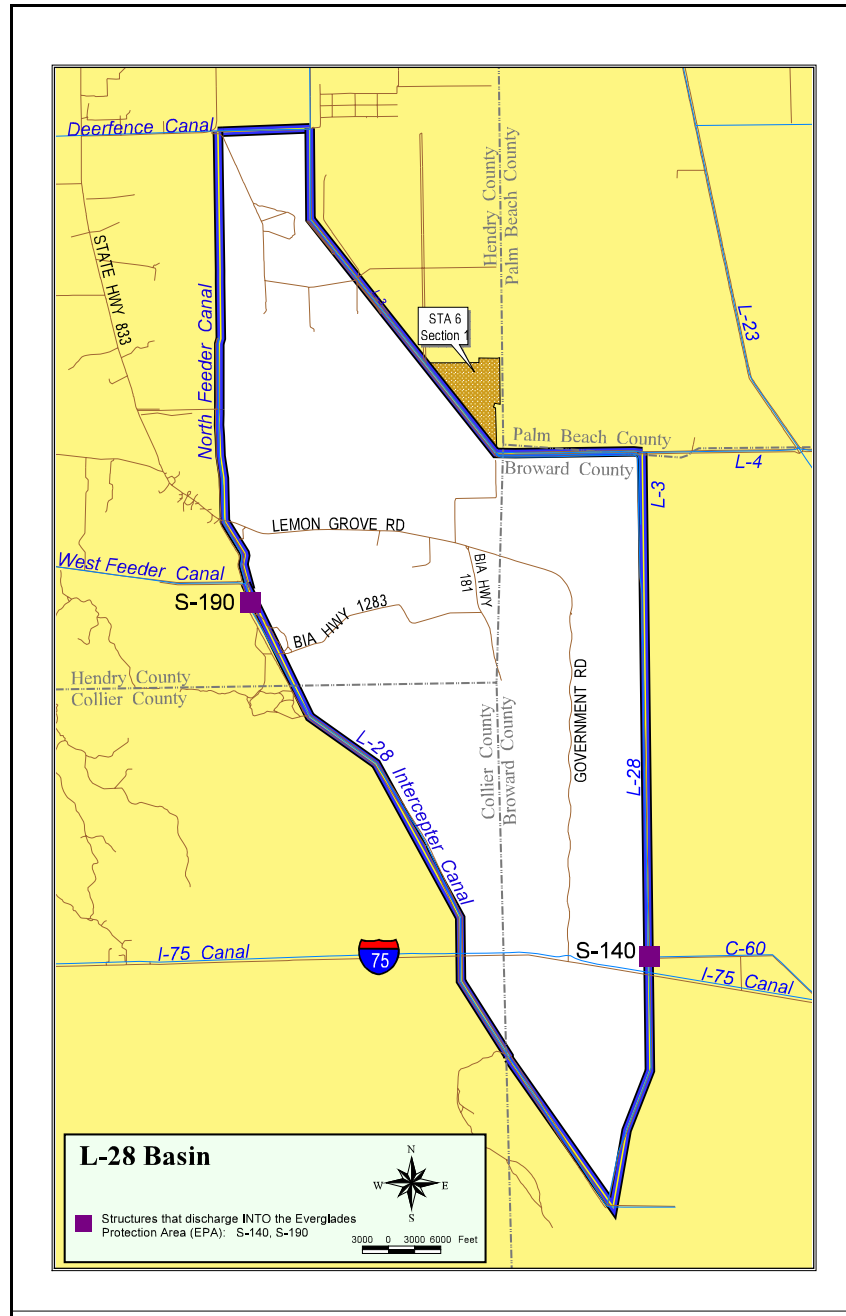


Figure 11-9. L-28 Basin.

FEEDER CANAL BASIN

The primary discharge structure in this basin is S-190, a reinforced concrete, gated spillway. A basin boundary map for this basin is provided as **Figure 11-10**. Unique to this basin, upstream structures WVEIR and NFEED are also District-owned and operated structures. The District routinely monitors and analyzes water quality data for these locations. In addition, improvements have been made to the upstream structures to enhance the quality of the flow data being collected.

The quality of discharges from the S-190 Structure for the period of May 1, 1998, to April 30, 1999, is summarized in Chapter 4 of this report. The annual flow-weighted mean total phosphorus concentration at S-190 for this period is 37 ppb. This value is lower than the annual flow-weighted mean TP value at S-190 for the period of May 1, 1997, to April 30, 1998, of 85 ppb. **Table 11-9** provides a side-by-side comparison of TP values for all monitoring periods. For non-phosphorus parameters the quality of discharges from S-190 for the period of May 1, 1998 to April 30, 1999 were very similar to values for the period of May 1, 1997 to April 30, 1998. Other than for dissolved oxygen, there were no excursions from Class III water qual-

ity criterion for any parameter. The installation of an autosampler was recommended and District staff is currently investigating alternatives for installation of equipment that best suit the hydraulic flow patterns at this location.

In 1996 the Seminole Tribe and the District executed an agreement addressing a full range of water resource issues concerning the Seminole Tribe's Big Cypress Indian Reservation. The parties have been working on a variety of issues related to implementation of this agreement. A Working Group comprised of various interested third parties, as well as the Seminole Tribe and District, have met on a bimonthly basis to review the status of implementation requirements. The Tribe has been monitoring the quality of discharges from the Reservation for approximately two years.

Furthermore, a water quality grab sampling survey was conducted by the District between June 1996 and October 1997 for structures upstream of WVEIR and NFEED serving lands outside of the Seminole Tribe's Big Cypress Indian Reservation. This survey resulted in a report identifying two areas as potential sources of water quality concerns, McDaniel Ranch and Fry Basin.

Table 11-9. Flow-weighted mean TP concentrations for the S-190 Structure.

Station ID	May 1, 1998 to April 30, 1999		May 1, 1997 to April 30, 1998		Oct 1, 1988 to April 30, 1997		Oct 1, 1978 to Sept 30, 1988	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L	Flow-Weighted Mean Concentration µg/L
S-190	73	76	85	81	147	ND	ND	ND

1) ND - no data available.

2) Flow-weighted Mean Concentration Column (1) based on days of flow and monitored TP data only.

3) Flow-weighted Mean Concentration Column (2) based on estimation algorithm to determine TP concentration on non-flow days.

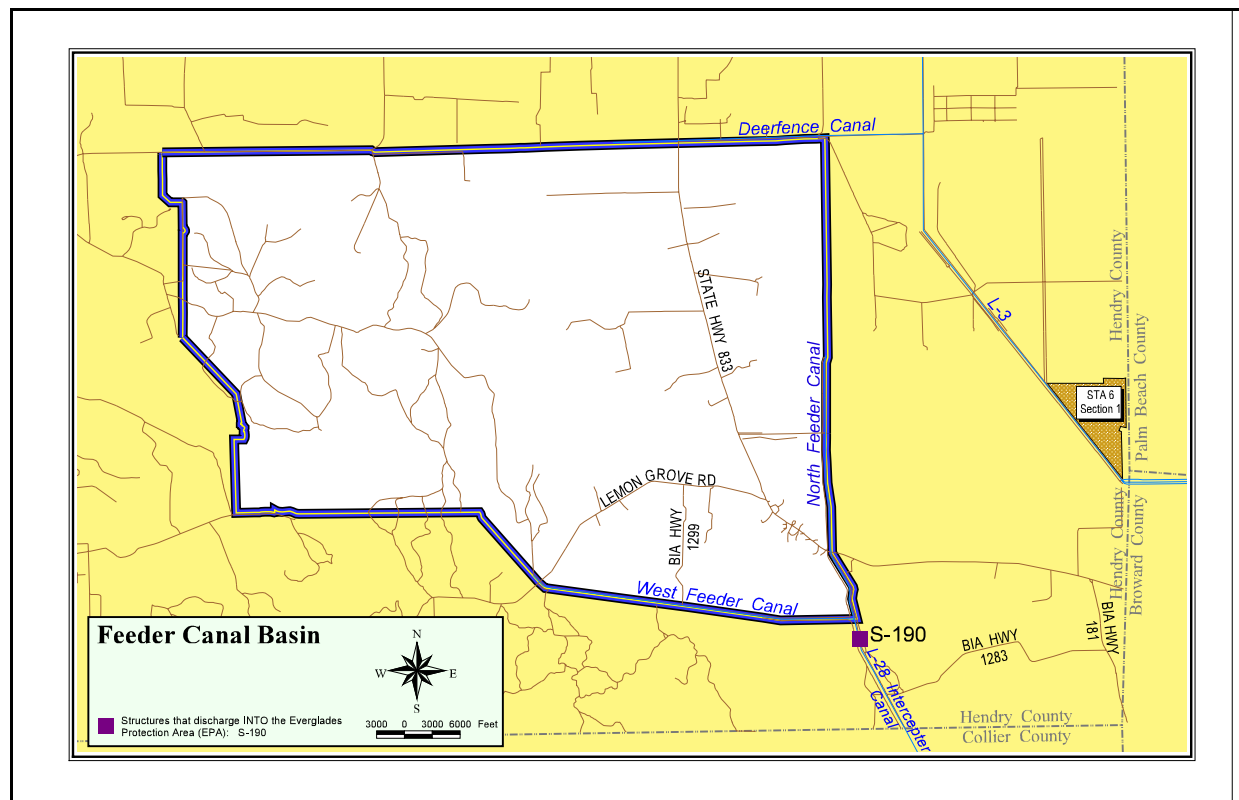


Figure 11-10. Feeder Canal Basin.

McDaniel Ranch received Environmental Resource Permit #26-00623-P from the District on January 14, 1999. The permit authorized construction and operation of a master surface water management system to serve a 21,597-acre agricultural project discharging to the North Feeder Canal and a wetland slough system in the southwest corner of the project. The permit incorporated numerous activities which have occurred relative to the Landowner Agreement between the McDaniel Ranch and Seminole Tribe. The project discharges (the compliance points at McDaniel Ranch) are being monitored for total phosphorus in cooperation with

the landowner. The use of pre-treatment areas which are required in the permit, are presently under construction. The District will continue to coordinate and analyze the data submitted by the permittee to ensure compliance.

The Fry Basin has completed installation of BMPs recommended by the National Resource Conservation Service. District staff is working in cooperation with the permittee to collect water quality data to measure the effectiveness of the BMPs.

ADDITIONAL STRATEGIES AFFECTING ESP & NON-ECP STRUCTURES

In addition to the programs described above, the ESP and Non-ECP permit will be affected by a number of other ongoing District and intergovernmental restoration strategies. As the following strategies progress, additional efforts by the District's ESP staff may be required.

C&SF RESTUDY

The C&SF Restudy recommends a comprehensive plan for the restoration, protection and preservation of the water resources of central and southern Florida, including the Everglades. The Final Integrated Feasibility Report and Programmatic Environmental Impact Statement, released in April 1999, identify and discuss the plan's proposed project features, its beneficial effects and potential impacts on existing resources.

The release of the final report triggered an additional State agency review, and comments from the Office of the Governor were transmitted to the Secretary of the Army in May 1999. In February 1999, the Governing Board of the District signed a letter of intent supporting the Comprehensive Plan as a guideline for solving the region's environmental and water resource problems on a

regional scale. The report was transmitted through the USACE's Division Engineer and the Washington-level federal report review process. The Assistant Secretary of the Army for Civil Works, representing the Secretary of the Army, coordinated the documents with the Office of Management and Budget.

The report was transmitted to Congress in July 1999. Congress is expected to act upon the recommendations contained within the report in the Water Resources Development Act of 2000. Additionally, the 1999 Florida Legislature passed Senate Bill 1672, which authorized the District to act as local sponsor for the C & SF Project components, and provided oversight and approval of project components by the DEP. A detailed description and status update of the C&SF Restudy is included in Chapter 10 of this report.

WATER PRESERVE AREAS (WPAS)

The WPAs Feasibility Study is a joint study between the District and USACE. The study area is concentrated primarily along the eastern boundary of the Everglades Protection Area with the objectives of creating a buffer between development in

south Florida and the Everglades Protection Area as well as providing water quality, water supply, flood control and environmental benefits. The present schedule calls for the completion of the feasibility study by January 2002. For cost savings purposes, the District has an aggressive WPA land acquisition program proceeding in advance of conceptual design. A detailed description and status update of the WPAs are included in Chapter 10 of this report.

MIAMI- DADE COUNTY LAKE BELT PLAN

The Lake Belt Area is an 89-square mile area located between the Everglades Protection Area and the urbanized areas of Miami-Dade County and provides half of the limestone mining resources used in the state every year. Approximately two-thirds of the land within the Lake Belt Area is owned by industry or government agencies. The Miami-Dade County Lake Belt Plan Implementation Committee was created by the Florida Legislature to develop a plan, which enhances the water supply for Miami-Dade County and the Everglades, and maximizes efficient recovery of limestone while promoting the social and economic welfare of the community and protecting the environment.

The development of a master plan for this area is important in allowing it to be developed as part of the overall Everglades restoration efforts. One of the fundamental prerequisites for restoring the Everglades ecosystem is restoring the hydrology of the area. Hydrologic restoration efforts to date have focused on restoring a more natural hydropattern by implementing rainfall driven water deliveries, improving water conveyance through the system, increasing storage capacity, and minimizing the amount of water lost from the Everglades Protection Area. Preventing water losses from seepage is an integral component of restoration. Due to the proximity of the Lake Belt Area to the eastern edge of the Everglades Protection Area, the impacts of the lakes on seepage have been given serious con-

sideration in the master plan's design, especially in respect to the locations of the lakes.

In early 1997 the Lake Belt Committee completed the Phase I Master Plan. This plan established the overall environmental permitting framework to create a coordinated freshwater lake system to replace the unplanned checkerboard mosaic of quarried lakes now being created at a rate of 300 to 400 acres per year. The Phase I Plan contained specific recommendations concerning a strategy for streamlining the permitting process for rock mining; specifying areas for mining, mitigation, and additional analysis; authorizing government/industry land exchanges; and developing a Phase II Detailed Master Plan.

The Florida Legislature found that the impact of mining within the Lake Belt Area could best be offset by the implementation of a comprehensive mitigation plan as recommended in the Lake Belt Committee's 1998 Progress Report. The adoption of the Lake Belt Mitigation Plan by the Legislature (House Bill 329) required that beginning October 1, 1999, a mitigation fee of \$.05/ton will be imposed on all limerock and sand sold from within the Lake Belt Area. This fee is to be used exclusively to perform mitigation activities to offset impacts due to mining such as acquiring environmentally sensitive lands to restore, manage and maintain their natural functions. The bill also extends the life of the Lake Belt Committee for one year to January 1, 2001, and expands Phase II analysis. The committee is directed to study the feasibility of a non-rock mining mitigation plan and the hydrologic impacts of rock mining. The Committee has also initiated studies necessary for the development of an enhanced wellfield protection program for the Lake Belt Area. The Phase II final Detailed Master Plan is currently scheduled for completion in December 2000. Additionally, the Lake Belt Plan has become an intricate part of the C & SF Restudy. A detailed description and status update of the Lake Belt Plan are included in Chapter 10 of this report.

CONCLUSIONS

The Everglades Stormwater Program provides administrative and technical guidance and support for many District-wide actions, programs and projects that are being initiated to fulfill legislative mandates for the restoration and protection of the Everglades. This and other chapters of this report fulfill Non-ECP permit reporting requirements by providing DEP with an update on the status of the implementation of the strategies identified in the permit (see **Table 11-2**). No later than December

31, 2003, the District will submit a permit application, pursuant to section (10) of the Act, for a Long-Term Compliance Permit. The Act requires the Long-Term Compliance Permit application to include detailed plans to achieve and maintain compliance with water quality standards in the Everglades, including engineering design documents, funding sources, and schedules for implementation. Compliance with the water quality standards must be achieved by December 31, 2006.

FINDINGS ON THE EVERGLADES STORMWATER PROGRAM

- The District's water quality monitoring program, implemented as a result of the Act and the Non-ECP permit, indicates that the quality of water discharging into the EPA is generally acceptable with the exception of phosphorus concentrations discharging from the Wellington/ACME, Feeder Canal and L-28 basins. However, with a potential phosphorus numerical standard of 10 ppb, any basin not meeting this standard will be required to implement appropriate water quality improvement measures.
- To achieve the goals/requirements of the Act, the Non-ECP permit, and the future Long Term Compliance Permit, extensive coordination with local governments, 298 Districts, Miccosukee and Seminole Indian tribes and other state and federal agencies is essential. Several meetings have been conducted to foster this coordination within the Wellington/ACME, C-11 West, North Springs Improvement District, North New River, Feeder Canal and Boynton

Farms basins. The public involvement element of ESP will provide additional avenues of participation for environmental groups, the agricultural and urban communities, and the general public.

- After cursory reviews of existing water quality monitoring programs upstream of the direct Into structures, it appears necessary to revise existing programs and implement new programs where none currently exist in order to better characterize water quality within the basins. A revised monitoring program within the Wellington/ACME basin is currently being implemented. Recommendations for implementation of new water quality monitoring programs and revisions to existing programs are also being developed in other basins. Concurrently, the District will continue to monitor water quality in accordance with the Non-ECP permit in order to measure progress towards achieving compliance with State water quality standards.